

CLAIMS

1. A method of pressure forming a metal matrix composite, comprising:
 - placing a fibre preform into a die cavity;
 - 5 introducing molten metal into the die cavity through a sprue to envelope the fibre preform;
 - sealing the sprue;
 - applying pressure to molten metal in the die cavity with a mechanical compaction piston to encourage
 - 10 infiltration of the fibre preform;
 - characterised in that the mechanical compaction piston is configured to apply pressure direct to molten metal in the die cavity during solidification.
2. A method according to claim 1, further comprising
- 15 advancing the mechanical compaction piston towards the die cavity when applying pressure to molten metal in the die cavity.
3. A method according to claim 2, in which the mechanical compaction piston projects into the die cavity
- 20 when applying pressure to molten metal in the die cavity.
4. A method according to any one of the preceding claims, further comprising applying pressures in the range 400 bar to 2500 bar to molten metal in the die cavity during solidification using the mechanical compaction
- 25 piston.
5. A method according to any one of the preceding method claims, further comprising ejecting solidified

metal matrix composite from the die cavity by actuating the mechanical compaction piston.

6. A method according to any one of the preceding claims, further comprising evacuating the die cavity prior to introducing molten metal therein.

7. A method according to claim 6, further comprising depressurizing the molten metal prior to its introduction into the die cavity.

8. A method according to claim 7, further comprising evacuating the die cavity and depressurizing the molten metal via separate pathways.

9. A method according to claim 7 or claim 8, in which molten metal is introduced into the die cavity via a pressure differential between the die cavity and molten metal of less than 50 bar.

10. Apparatus for liquid pressure forming a metal matrix component, comprising:

a die defining a die cavity for receiving a fibre preform, and a sprue for channelling molten metal into the die cavity; and

a mechanical compaction piston configured to apply pressure direct to molten metal in the die cavity during solidification.

11. Apparatus according to claim 10, in which the mechanical compaction piston is configured to advance towards the die cavity when applying pressure to molten metal in the die cavity.

12. Apparatus according to claim 11, in which the mechanical compaction piston is configured to project into the die cavity when applying pressure to molten metal in the die cavity.

5 13. Apparatus according to any one of claims 10 to 12, in which the die comprises: a first part defining at least a portion of the die cavity with at least one external opening; and a second part defining a chamber for housing the first part, the chamber having at least one opening
10 which is registrable with the at least one external opening of the first part when housed in the second part.

14. A method of casting a component from a metal having a liquidus temperature, comprising:

providing a die comprising: a first part defining at
15 least part of a die cavity with an external opening; and a second part defining a chamber for housing the first part, the chamber having an opening which is registrable with the external opening of the first part when housed in the second part;

20 heating the first part of the die to a temperature above the liquidus temperature of the metal whilst maintaining the second part of the die at a temperature below the liquidus temperature of the metal;

placing the first part of the die in the chamber of
25 the second part with the chamber opening registered with the external opening of the first part;

introducing molten metal into the die cavity through

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the chamber opening; and

solidifying molten metal in the die cavity.

15. A method according to claim 14, further comprising removing the first part of the die from the second part 5 after solidification, and cooling the first part independently of the second part before removing the solidified component from the first part.

16. A die for use in liquid pressure forming a metal matrix component, comprising: a first part defining at 10 least part of a die cavity with an external opening; and a second part defining a chamber for housing the first part, the chamber having an opening which is registrable with the external opening of the first part when housed in the second part, the chamber opening and external opening 15 being configured for introducing molten metal into the die cavity when registered, wherein the first part is removable from the second part without disturbing the die cavity of the first part.

17. A die according to claim 16, in which the first and 20 second parts each comprise at least two sections so that each part may be split open, with sections of one part being configured to separate in a different direction to sections of the other part.

18. A die according to claim 16 or 17, in which the 25 first part has a profile which tapers in one or more directions to facilitate release from the second part.